General

Guideline Title

Dental interventions to prevent caries in children. A national clinical guideline.

Bibliographic Source(s)

Scottish Intercollegiate Guidelines Network (SIGN). Dental interventions to prevent caries in children. A national clinical guideline. Edinburgh (Scotland): Scottish Intercollegiate Guidelines Network (SIGN); 2014 Mar. 45 p. (SIGN publication; no. 138). [138 references]

Guideline Status

This is the current release of the guideline.

This guideline updates previous versions:

Scottish Intercollegiate Guidelines Network (SIGN). Prevention and management of dental decay in the pre-school child. A national clinical guideline. Edinburgh (Scotland): Scottish Intercollegiate Guidelines Network (SIGN); 2005 Nov. 41 p. (SIGN publication; no. 83). [181 references]

Preventing dental caries in children at high caries risk: targeted prevention of dental caries in the permanent teeth of 6-16 year olds presenting for dental care. A national clinical guideline. Edinburgh (Scotland): Scottish Intercollegiate Guidelines Network (SIGN); 2000. 39 p. (SIGN publication; no. 47). [115 references]

Any amendments to the guideline in the interim period will be noted on Scottish Intercollegiate Guidelines Network (SIGN) Web site .

Recommendations

Major Recommendations

Note from the Scottish Intercollegiate Guidelines Network (SIGN) and National Guideline Clearinghouse (NGC): In addition to these evidence-based recommendations, the guideline development group also identifies points of best clinical practice in the full-text guideline document.

The grades of recommendations (A-D) and levels of evidence (1++, 1+, 1-, 2++, 2+, 2-, 3, 4) are defined at the end of the "Major Recommendations" field.

Predicting Caries Risk

Carries Risk Assessment

C - The following factors should be considered when assessing caries risk:

- Clinical evidence of previous disease
- Dietary habits, especially frequency of sugary food and drink consumption
- Social history, especially socioeconomic status
- Use of fluoride
- Plaque control
- Saliva
- Medical history

D - Specialist child healthcare professionals should consider carrying out a caries risk assessment of children in their first year as part of the child's overall health assessment.

D - Children whose families live in a deprived area should be considered as at increased risk of early childhood caries when developing preventive programmes.

Delivery of Dental Brief Interventions in the Practice Setting

Effectiveness of Dental Brief Interventions

B - Oral health promotion interventions should facilitate daily toothbrushing with fluoride toothpaste.

Format of Dental Brief Interventions

B - Oral health promotion interventions should be based on recognised health behaviour theory and models such as motivational interviewing.

Social Determinants of Oral Health

C - As part of the patient assessment, a social history should be taken which will contribute to dental brief interventions being specific to individuals and tailored to their particular needs and circumstances.

Toothbrushing with Fluoride Toothpaste

Concentration of Fluoride Toothpaste

A - Following risk assessment, children and young people up to the age of 18 years who are at standard risk of developing dental caries should be advised to use toothpastes in the range 1,000 to 1,500 parts per million fluoride (ppmF).

A - Following risk assessment, children aged from 10 to 16 years who are at increased risk of developing dental caries should be advised to use toothpastes at a concentration of 2,800 ppmF.

Frequency and Duration of Brushing

Frequency of Toothbrushing

A - Toothbrushing with fluoride toothpaste should take place at least twice daily.

Supervised Toothbrushing

A - Supervision of toothbrushing with fluoride toothpaste is recommended as an effective caries prevention measure.

Toothbrushing Practice

A - Children should be encouraged to spit out excess toothpaste and not rinse with water after brushing.

Topical Anticaries Interventions

Topical Fluoride Varnish

A - Fluoride varnish should be applied at least twice yearly in all children.

Sealants

Use of Sealants

A - Resin-based fissure sealants should be applied to the permanent molars of all children as early after eruption as possible.

Definitions:

Levels of Evidence

1++: High quality meta-analyses, systematic reviews of randomised controlled trials (RCTs), or RCTs with a very low risk of bias

1+: Well-conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias

1-: Meta-analyses, systematic reviews, or RCTs with a high risk of bias

2++: High quality systematic reviews of case control or cohort studies

High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal

2+: Well-conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal

2-: Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal

3: Non-analytic studies (e.g., case reports, case series)

4: Expert opinion

Grades of Recommendation

Note: The grade of recommendation relates to the strength of the evidence on which the recommendation is based. It does not reflect the clinical importance of the recommendation.

A: At least one meta-analysis, systematic review, or RCT rated as 1++ and directly applicable to the target population; *or*

A body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results

B: A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; *or*

Extrapolated evidence from studies rated as 1++ or 1+

C: A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; *or*

Extrapolated evidence from studies rated as 2++

D: Evidence level 3 or 4; *or*

Extrapolated evidence from studies rated as 2+

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Dental caries

Guideline Category

Management

Prevention

Risk Assessment

Clinical Specialty

Dentistry

Pediatrics

Preventive Medicine

Intended Users

Allied Health Personnel

Dentists

Other

Public Health Departments

Guideline Objective(s)

To provide recommendations based on current evidence for best practice in dental interventions to prevent caries in children and young people aged 0 to 18 years carried out by dental care teams within dental practices in Scotland

Target Population

Children and young people aged 0 to 18 years

Interventions and Practices Considered

Risk Assessment/Prevention

1. Caries risk assessment
2. Daily toothbrushing with fluoride toothpaste
    - Toothpaste concentration of 1,000 to 1,500 parts per million fluoride (ppmF) (standard risk) or 2,800 ppmF (increased risk)
    - Twice daily
    - Supervised brushing (if indicated)
    - Avoidance of post-brushing rinse
3. Oral health promotion (based on recognised health behaviour theory and models such as motivational interviewing)
4. Social history
5. Fluoride varnish at least twice a year
6. Resin-based fissure sealants applied to permanent molars

Note: The following interventions were considered but not recommended:

Dental floss
Interdental brushes and miswaks
Topical chlorhexidine varnish

Slow-release fluoride beads
Fluoride gels, drops, tablets, and mouthwash

Major Outcomes Considered

- Prevention of dental caries
- Improved oral health

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Systematic Literature Review

The evidence base for this guideline was synthesised in accordance with Scottish Intercollegiate Guidelines Network (SIGN) methodology. A systematic review of the literature was carried out using an explicit search strategy devised by a SIGN Evidence and Information Scientist. Databases searched include MEDLINE, EMBASE, CINAHL, PsycINFO and the Cochrane Library. The year range covered was 2000 to 2011. Internet searches were carried out on various websites including the U.S. National Guideline Clearinghouse. The main searches were supplemented by material identified by individual members of the development group. Each of the selected papers was evaluated by two members of the group using standard SIGN methodological checklists before conclusions were considered as evidence.

Please refer to the search narrative for further information on the search strategy, including search terms (see the "Availability of Companion Documents" field).

Literature Search for Patient Issues

At the start of the guideline development process, a SIGN Evidence and Information Scientist conducted a literature search for qualitative and quantitative studies that addressed patient issues of relevance to the prevention of dental caries in children. Databases searched include MEDLINE, EMBASE, CINAHL, and PsycINFO, and the results were summarised by the SIGN Patient Involvement Officer and presented to the guideline development group.

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Levels of Evidence

1++: High quality meta-analyses, systematic reviews of randomised controlled trials (RCTs), or RCTs with a very low risk of bias

1+: Well-conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias

1-: Meta-analyses, systematic reviews, or RCTs with a high risk of bias

2++: High quality systematic reviews of case control or cohort studies

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3: Non-analytic studies (e.g., case reports, case series)

4: Expert opinion

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Once papers have been selected as potential sources of evidence, the methodology used in each study is assessed to ensure its validity. The result of this assessment will affect the level of evidence allocated to the paper, which will in turn influence the grade of recommendation that it supports.

The methodological assessment is based on a number of key questions that focus on those aspects of the study design that research has shown to have a significant influence on the validity of the results reported and conclusions drawn. These key questions differ between study types, and a range of checklists is used to bring a degree of consistency to the assessment process. Scottish Intercollegiate Guidelines Network (SIGN) has based its assessments on the MERGE (Method for Evaluating Research and Guideline Evidence) checklists developed by the New South Wales Department of Health, which have been subjected to wide consultation and evaluation. These checklists were subjected to detailed evaluation and adaptation to meet SIGN's requirements for a balance between methodological rigour and practicality of use.

The assessment process inevitably involves a degree of subjective judgement. The extent to which a study meets a particular criterion - e.g., an acceptable level of loss to follow up - and, more importantly, the likely impact of this on the reported results from the study will depend on the clinical context. To minimise any potential bias resulting from this, each study must be evaluated independently by at least two group members. Any differences in assessment should then be discussed by the full group. Where differences cannot be resolved, an independent reviewer or an experienced member of SIGN Executive staff will arbitrate to reach an agreed quality assessment.

Evidence Tables

Evidence tables are compiled by SIGN executive staff based on the quality assessments of individual studies provided by guideline development group members. The tables summarise all the validated studies identified from the systematic literature review relating to each key question. They are presented in a standard format to make it easier to compare results across studies, and will present separately the evidence for each outcome measure used in the published studies. These evidence tables form an essential part of the guideline development record and ensure that the basis of the guideline development group's recommendations is transparent.

Additional details can be found in the companion document titled "SIGN 50: A Guideline Developers' Handbook." (Edinburgh [Scotland]: Scottish Intercollegiate Guidelines Network. [SIGN publication; no. 50]), available from the SIGN Web site .

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

Synthesising the Evidence

Guideline recommendations are graded to differentiate between those based on strong evidence and those based on weak evidence. This

judgement is made on the basis of an (objective) assessment of the design and quality of each study and a (perhaps more subjective) judgement on the consistency, clinical relevance and external validity of the whole body of evidence. The aim is to produce a recommendation that is evidence-based, but which is relevant to the way in which health care is delivered in Scotland and is therefore implementable.

It is important to emphasise that the grading does not relate to the importance of the recommendation, but to the strength of the supporting evidence and, in particular, to the predictive power of the study designs from which that data was obtained. Thus, the grading assigned to a recommendation indicates to users the likelihood that, if that recommendation is implemented, the predicted outcome will be achieved.

Considered Judgement

It is rare for the evidence to show clearly and unambiguously what course of action should be recommended for any given question. Consequently, it is not always clear to those who were not involved in the decision making process how guideline developers were able to arrive at their recommendations, given the evidence they had to base them on. In order to address this problem, Scottish Intercollegiate Guidelines Network (SIGN) has introduced the concept of considered judgement.

Under the heading of considered judgement, guideline development groups summarise their view of the total body of evidence covered by each evidence table.

Each guideline group considers the following factors:

- Quantity, quality, and consistency of evidence
- External validity (generalisability) of studies
- Directness of application to the target population for the guideline
- Any evidence of potential harms associated with implementation of a recommendation
- Clinical impact (i.e., the extent of the impact on the target patient population, and the resources needed to treat them in accordance with the recommendation)
- Whether, and to what extent, any equality groups may be particularly advantaged or disadvantaged by the recommendations made
- Implementability (i.e., how practical it would be for the National Health Service (NHS) Scotland to implement the recommendation.)

Then the group is asked to summarise its view on all of these issues, both the quality of the evidence and its potential impact, before making a graded recommendation. This summary should be succinct, and taken together with its views of the level of evidence represent the first draft of the text that will appear in the guideline immediately before a graded recommendation.

Additional detail about SIGN's process for formulating guideline recommendations is provided in Section 7 of the companion document titled "SIGN 50: A Guideline Developers' Handbook." (Edinburgh [Scotland]: Scottish Intercollegiate Guidelines Network. [SIGN publication; no. 50]), available from the SIGN Web site .

Rating Scheme for the Strength of the Recommendations

Grades of Recommendation

Note: The grade of recommendation relates to the strength of the evidence on which the recommendation is based. It does not reflect the clinical importance of the recommendation.

A: At least one meta-analysis, systematic review, or randomised controlled trial (RCT) rated as 1++ and directly applicable to the target population; or

A body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results

B: A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; or

Extrapolated evidence from studies rated as 1++ or 1+

C: A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or

Extrapolated evidence from studies rated as 2++

D: Evidence level 3 or 4; or

Extrapolated evidence from studies rated as 2+

Cost Analysis

Resource Implications of Key Recommendations

No recommendations are considered likely to reach the £5 million threshold which warrants full cost impact analysis.

Recommendations associated with significant material costs are as follows:

Fluoride Varnish

Maximum direct costs of providing two varnish applications to all eligible people aged 18 years or under in Scotland is around £1.5 million, however, a proportion of these will already be receiving varnish through Childsmile or through routine attendance at dental services. The Scottish Government has established a HEAT target aiming to achieve at least two applications of fluoride varnish per year in 60% of three-and four year old children by March 2014. While the national percentage of three- and four-year old children receiving at least two varnish applications increased in 2013, the overall levels are 20.2% and 22.5% respectively.

Fissure Sealants

Table: Estimated Direct Costs of Increasing Sealant Uptake from 30% to 60% in Scottish Children Aged 6–7 years and 11–12 Years

Number of Children Aged 6–7 Years	Proportion with Sealants	Costs Per Sealant (£)	Total Costs (£)
111,327	30%	7.95	1,062,059.58
	60%		2,124,119.16
Incremental cost of moving from 30% to 60% uptake			1,062,059.58

Number of Children Aged 11–12 Years	Proportion with Sealants	Costs Per Sealant (£)	Total Costs (£)
110,956	30%	7.95	1,058,520.24
	60%		2,117,040.48
Incremental cost of moving from 30% to 60% uptake			1,058,520.24

In the above table, costs of consultations have not been factored into the calculations. It was not possible to segregate visits incorporating treatment with visits representing routine examinations in this analysis, therefore the costs reported here may underestimate the total cost of service provision in NHSScotland. However, potential savings from fillings avoided are also excluded.

Method of Guideline Validation

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

The national open meeting is the main consultative phase of Scottish Intercollegiate Guidelines Network (SIGN) guideline development.

Peer Review

All SIGN guidelines are reviewed in draft form by independent expert referees, who are asked to comment primarily on the comprehensiveness and accuracy of interpretation of the evidence base supporting the recommendations in the guideline. A number of general practitioners (GPs) and other primary care practitioners also provide comments on the guideline from the primary care perspective, concentrating particularly on the clarity of the recommendations and their assessment of the usefulness of the guideline as a working tool for the primary care team. The draft is also sent to at least two lay reviewers in order to obtain comments from the patient's perspective.

It should be noted that all reviewers are invited to comment as individuals, not as representatives of any particular organisation or group. Corporate interests, whether commercial, professional, or societal have an opportunity to make representations at the national meeting stage where they can send representatives to the meeting or provide comment on the draft produced for that meeting. Peer reviewers are asked to complete a declaration of interests form.

The comments received from peer reviewers and others are carefully tabulated and discussed with the Chair and with the guideline development group. Each point must be addressed and any changes to the guideline as a result noted or, if no change is made, the reasons for this recorded.

As a final quality control check prior to publication, the guideline and the summary of peer reviewers' comments are reviewed by the SIGN Editorial Group for that guideline to ensure that each point has been addressed adequately and that any risk of bias in the guideline development process as a whole has been minimised. Each member of the guideline development group is then asked formally to approve the final guideline for publication.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Appropriate dental interventions to prevent caries in children

Potential Harms

Children are at risk of fluorosis of cosmetic importance until the age of around three years. During this period, the use of fluoridated products is a risk factor for the development of later fluorosis due to inadvertent swallowing of toothpaste and mouthwash. In order to balance the benefits of preventing dental caries against the potential harms of fluorosis associated with ingesting fluoride toothpaste, children under three years of age should use no more than a smear of toothpaste.

Qualifying Statements

Qualifying Statements

- This guideline is not intended to be construed or to serve as a standard of care. Standards of care are determined on the basis of all clinical data available for an individual case and are subject to change as scientific knowledge and technology advance and patterns of care evolve. Adherence to guideline recommendations will not ensure a successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgement must be made by the appropriate healthcare professional(s) responsible for clinical decisions regarding a particular clinical procedure or treatment plan. This judgement should only be arrived at following discussion of the options with the patient, covering the diagnostic and treatment choices available. It is, however, advised that significant departures from the national guideline or any local guidelines derived from it should be fully

documented in the patient's case notes at the time the relevant decision is taken.

- Recommendations within this guideline are based on the best clinical evidence. Some recommendations may be for medicines prescribed outwith the marketing authorisation (MA) also known as product license. This is known as 'off label' use.
  Medicines may be prescribed outwith their product licence in the following circumstances:

  - For an indication not specified within the marketing authorisation
  - For administration via a different route
  - For administration of a different dose
  - For a different patient population

  An unlicensed medicine is a medicine which does not have MA for medicinal use in humans.

  Generally 'off label' prescribing of medicines becomes necessary if the clinical need cannot be met by licensed medicines within the marketing authorisation. Such use should be supported by appropriate evidence and experience.

  "Prescribing medicines outside the conditions of their marketing authorisation alters (and probably increases) the prescribers' professional responsibility and potential liability".

  The General Medical Council (GMC) recommends that when prescribing a medicine 'off label', doctors should:

  - Be satisfied that such use would better serve the patient's needs than an authorised alternative (if one exists)
  - Be satisfied that there is sufficient evidence/experience of using the medicines to show its safety and efficacy, seeking the necessary information from appropriate sources
  - Record in the patient's clinical notes the medicine prescribed and, when not following common practice, the reasons for the choice
  - Take responsibility for prescribing the medicine and for overseeing the patient's care, including monitoring the effects of the medicine

  Non-medical prescribers should ensure that they are familiar with the legislative framework and their own professional prescribing standards.

  Prior to any prescribing, the licensing status of a medication should be checked in the summary of product characteristics (SPC). The prescriber must be competent, operate within the professional code of ethics of their statutory bodies and the prescribing practices of their employers.

Implementation of the Guideline

Description of Implementation Strategy

Implementation of national clinical guidelines is the responsibility of each National Health Service (NHS) Board and is an essential part of clinical governance. Mechanisms should be in place to review care provided against the guideline recommendations. The reasons for any differences should be assessed and addressed where appropriate. Local arrangements should then be made to implement the national guideline in individual hospitals, units and practices.

Refer to Section 10 in the original guideline for information on resource implications associated with implementing the key clinical recommendations and advice on audit as a tool to aid implementation.

Implementation Tools

Audit Criteria/Indicators

Mobile Device Resources

Quick Reference Guides/Physician Guides

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report

Categories

IOM Care Need

Staying Healthy

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

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Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2000 Dec (revised 2014 Mar)

Guideline Developer(s)

Scottish Intercollegiate Guidelines Network - National Government Agency [Non-U.S.]

Source(s) of Funding

Scottish Government Health and Social Care Directorate

Guideline Committee

Guideline Development Group

Composition of Group That Authored the Guideline

Guideline Development Group: Mr Derek Richards (*Chair*), Consultant in Dental Public Health, NHS Forth Valley and Director, Centre for Evidence-based Dentistry, University of Dundee; Professor Jan Clarkson, Director of the Effective Dental Practice Programme, Honorary Consultant in Paediatric Dentistry, University of Dundee; Miss Kay Cullen, Dental Hygienist, Prestwick; Ms Tina Everington, Senior Health Promotion Officer, NHS Forth Valley; Dr Eleanor Ferguson, General Dental Practitioner, Kirriemuir; Mr Martin Foster, Specialist in Paediatric Dentistry, NHS Lothian; Ms Tina Halford, Lay representative, Dundee; Dr Andrew Hall, Senior Lecturer and Honorary Consultant in Restorative Dentistry, University of Dundee; Mr Nathan Harrison, General Dental Practitioner, Glasgow; Dr Nicola Innes, Senior Clinical Lecturer in

Paediatric Dentistry, University of Dundee; Dr Moray Nairn, Programme Manager, SIGN; Mrs Margaret Ross, Senior Lecturer for Dental Care Professionals, Edinburgh Dental Institute; Mrs Lynne Smith, Evidence and Information Scientist, SIGN; Mr Graeme Wright, Specialist in Paediatric Dentistry, Larbert; Dr Linda Young, Research and Development Manager, Scottish Dental Clinical Effectiveness Programme, NHS Education for Scotland

Financial Disclosures/Conflicts of Interest

All members of the guideline development group made declarations of interest. A register of interests is available in the supporting material section for this guideline at Scottish Intercollegiate Guidelines Network (SIGN) Web site .

Guideline Status

This is the current release of the guideline.

This guideline updates previous versions:

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Any amendments to the guideline in the interim period will be noted on Scottish Intercollegiate Guidelines Network (SIGN) Web site .

Guideline Availability

Electronic copies: Available in from the Scottish Intercollegiate Guidelines Network (SIGN) Web site .

Availability of Companion Documents

The following are available:

- Quick reference guide: prevention and management of dental decay in the pre-school child. Edinburgh (Scotland): Scottish Intercollegiate Guidelines Network; 2014 Mar. 2 p. Electronic copies: Available from the Scottish Intercollegiate Guidelines Network (SIGN) Web site .
- Search strategy: Prevention of dental caries. Edinburgh (Scotland): Scottish Intercollegiate Guidelines Network; 2014 Mar. 6 p. Electronic copies: Available from the SIGN Web site .
- SIGN 50: A guideline developer's handbook. Edinburgh (Scotland): Scottish Intercollegiate Guidelines Network; 2011 Sep. 111 p. (SIGN publication; no. 50). Electronic copies: Available from the SIGN Web site .

In addition, Section 10 in the original guideline document contains key points to audit.

Executive summaries of SIGN guidelines are available for mobile devices through the guidelines app on the SIGN Web site .

Patient Resources

None available

NGC Status

This summary was completed by ECRI on October 17, 2001. The information was verified by the guideline developer as of December 17, 2001. This summary was updated by ECRI Institute on June 20, 2014. The updated information was verified by the guideline developer on July 16, 2014.

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